SOIL AND GROUND-WATER INVESTIGATION
POTTERS INDUSTRIES, CARLSTADT, NEW JERSEY

November 1988

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SOIL AND GROUND-WATER INVESTIGATION
POTTERS INDUSTRIES, INC.
CARLSTADT, NEW JERSEY

INTRODUCTION

In July 1988, Geraghty & Miller, Inc. was retained by Potters Industries, Inc. to conduct an investigation of soil and ground-water quality conditions at the Potters Industries facility in Carlstadt, New Jersey. The site location is shown on Figure 1. The primary objective of this investigation was to develop an assessment of soil and shallow ground-water quality conditions in proximity to an underground storage tank (UGST) at the site.

Background

Potters Industries initiated the removal of an UGST adjacent to the building at the Carlstadt facility that was no longer in use. The UGST had a capacity of 10,000 gallons and was used to store No. 2 fuel oil to provide a back-up fuel source for the furnaces used during plant operations.

Potters Industries arranged for the fuel in the tank to be pumped out, and the tank excavation began on July 10, 1988. On July 12, 1988, contaminated soil was detected in proximity to the partially excavated tank. Potters Industries personnel immediately notified the

New Jersey Department of Environmental Protection - Bureau of Underground Storage Tanks (NJDEP-BUST) and the Bergen County Health Department. The NJDEP-BUST provided Potters Industries with a general scope of work to be implemented during investigation and corrective action in association with potential discharges from an UGST. The NJDEP-BUST scope of work is presented in Appendix A. Potters Industries subsequently retained Geraghty & Miller to assist in compliance with the NJDEP-BUST scope of work.

Objective

The principal objective of the site investigation was to assess soil and ground-water quality conditions in proximity to the UGST at the Potters facility.

In order to accomplish this objective, the following tasks were carried out:

- The removal and abandonment of the UGST.
- The excavation of all soil with free product.
- The collection of 2 soil samples for waste classification.
- The installation and development of 3 shallow monitoring wells and the collection of ground-water samples for chemical analysis.

- The measurement of ground-water levels in the monitoring wells during four synoptic events.

FIELD PROGRAM

Underground Storage Tank Removal Program

The UGST at the Potters facility had a capacity of 10,000 gallons. The tank was constructed of steel and was used to store No. 2 fuel oil. The tank removal began on July 10, 1988, prior to Geraghty & Miller involvement. On July 12, 1988 contaminated soil was detected in proximity to the partially excavated UGST. Potters Industries notified the NJDEP-BUST and the Bergen County Health Department, and retained Geraghty & Miller to assist in the compliance of the NJDEP-BUST scope of work.

The cleaning of the tank, the excavation prior to removal, and the disposal of the tank were carried out by a contractor under the supervision of Potters Industries personnel. A Geraghty & Miller representative was on site to document the tank condition, photograph the tank and excavation, and collect samples of the stockpiled excavated soil for waste classification analysis.

The soil excavation was based on the extent of soil contaminated with free product. A Geraghty & Miller hydrogeologist determined

product-contaminated soil by employing the soil/water agitation method and the field sorption method, as described in the NJDEP-BUST scope of work.

Upon completion of the excavation, the attending Geraghty & Miller hydrogeologist collected two composite soil samples from the stockpiled soil. The samples were collected in accordance with the NJDEP Division of Hazardous Site Mitigation JField Sampling Manual, July 1986. The samples were collected from approximately 140 cubic yards of stockpiled soil.

The samples were analyzed by a certified New Jersey laboratory for hazardous waste characteristics and total petroleum hydrocarbons (TPHC). The analytical results are summarized in Table 1; the complete laboratory report (including results, analytical methodology, chain-of-custody records, and laboratory chronicles) is provided in Appendix B.

Monitoring Well Drilling and Installation

Between August 8 and August 10, 1988, 3 shallow monitoring wells were installed to a depth of approximately 20 feet below land surface at the subject facility by Summit Drilling Company, Inc. of Bridgewater, New Jersey. An attending Geraghty & Miller hydrogeologist documented the monitoring well installation. The monitoring well locations are shown on Figure 2.

The boreholes were drilled by the hollow-stem auger method, employing 8 1/2 inch inside diameter augers. Geologic samples were collected with a split-spoon sampler. The samples were described by the Geraghty & Miller field hydrogeologist; soil logs are presented in Appendix C.

The monitoring wells (designated MW-1, MW-2, and MW-3) are constructed of 4-inch diameter, flush-jointed, PVC casing and 0.020-inch slot well screen. The casing and screen assemblies were installed in open holes, and sand was placed in the annular space between the screen and borehole. The sand extends from the bottom of the borehole to approximately 2 feet above the screen. A 1-to-2 foot layer of bentonite pellets was placed in the annular space at the top of the sand and a "Benseal" cement mixture was placed on top of the pellets, filling the annular space from the top of the layer of bentonite pellets to ground surface.

The wells were developed by pumping with a centrifugal pump for one hour or until clean water was pumped. The monitoring wells were protected with protective pipe and locking cap assemblies. Construction details for the monitoring wells are presented in Table 2.

The elevations of the top of the inner casing, top of the outer casing, and ground surface for each well were determined by a New Jersey licensed surveyor, to an accuracy of 0.01 foot. Ground-water

levels were measured during four synoptic events, and these data were used to calculate ground-water elevations. Elevation and water-level data are presented in Table 3.

During the backfilling of the excavation, a concrete sump was placed in the center of the excavation. The sump was constructed to act as a collection point for potential floating product.

Ground-Water Sampling

The 3 monitoring wells and the sump were sampled on August 30, 1988 for the parameters listed in Table 4. The monitoring wells and sump were excavated with a centrifugal pump; five well volumes were removed prior to sampling. New 3/8-inch diameter polyethylene tubing was used as suction line for each well during pumping. Water samples were collected using a clean teflon bailer and transferred directly to appropriate sample containers. The water sample collected from the sump was designated MW-4.

Prior to completing the sampling event, a blind field blank (designated MW-6) was prepared by transferring distilled water to a freshly cleaned bailer and then to the laboratory-supplied sample container to document the thoroughness of equipment decontamination procedures. A replicate sample was collected from monitoring well MW-3 for the parameters listed in Table 4 and was labelled MW-5. As an additional QA/QC measure, a trip blank accompanied sample containers from the laboratory to the field and back. For each

sample, pH, specific conductance, and temperature were measured in the field at the time of sample collection. Samples were stored on ice until delivery to Envirotech Research, Inc. of Edison, New Jersey for analysis.

Chain-of-Custody forms were used to document sample handling. All of the water samples were analyzed for the parameters listed in Table 4 by USEPA Methods 624 and 625, in accordance with the NJDEP-BUST scope of work.

Water-Level Measurements

Ground-water level measurements were made in the monitoring wells during four synoptic events; these water-level data are summarized in Table 3. The collected water-level data collected on October 25, 1988 were used to construct the water-level contour map shown on Figure 3.

GROUND-WATER QUALITY

Water samples were collected from the 3 monitoring wells and the sump on August 30, 1988; Environmental Research of Edison, New Jersey performed the analytical work. The analytical results are summarized in Table 5; the complete laboratory report is provided in Appendix D. Water samples were analyzed for volatile organic compounds (VOCs) and base/neutral extractable organic compounds (B/N) by USEPA Methods 624 and 625.

The VOC analytical results indicate the presence of ethane, 1-1-oxybis at a concentration of 8.6 parts per billion (ppb) in monitoring well MW-2 and chloroform at a concentration of 4.4 ppb in MW-1. No other VOCs were detected. These VOC concentrations are within the Bureau of Industrial Site Evaluation (BISE) cleanup guideline for VOCs in ground water. These cleanup guidelines are provided in Appendix E.

Several B/N compounds were detected in low concentrations (below the detection limits) in monitoring wells MW-2, MW-3, and the sump. The B/N analysis indicated the presence of bis (2-ethylhexyl) phthalate at concentrations ranging from 1.1 to 9.7 ppb. However, this constituent was also detected in the quality control field blank sample. As such, these results may be indicative of laboratory and/or equipment contamination rather than actual field concentrations. The B/N analysis also indicated the presence of pyrene at a concentration of 0.3 ppb in the sump. No other B/N were detected. The B/N concentrations are within the BISE cleanup guideline for the B/Ns in ground water.

RECOMMENDATIONS

The concentrations of VOCs and B/N compounds in all monitoring well samples were below cleanup guidelines established by the NJDEP-BISE.

In that recommended cleanup guidelines have not been exceeded, it is recommended the 3 monitoring wells and sump be abandoned with NJDEP-BUST approval. The wells and sump should be sealed in

accordance with NJDEP standard specifications for sealing abandoned wells. The work should be performed by a New Jersey certified well sealer.

Respectfully submitted,

GERAGHTY & MILLER, INC.

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NJ1533CR01/102588.

TABLES

Table 1: Summary of Hazardous Waste Classification Results

Parameter	S-1	S-2
Arsenic	ND	ND
Barium	ND	ND
Cadmium	ND	ND
Chromium	ND	ND
Lead	ND	ND
Mercury	ND	ND
Selenium	ND	ND
Silver	ND	ND
Sulfide Reactivity	ND	ND
Cyanide Reactivity	ND	ND
pH	8.23	8.78
Corrosivity	Non-Corrosive	Non-Corrosive
Ignitability	>160 F	>160 F
PCB's (ppm)	ND	3.97
TPHC (ppm)	3720	12700

Note:

ND - Parameter analyzed for but not detected.
ppm - parts per million
F - degrees Fahrenheit

NJ1533CR1/hwid

Table 2: Monitoring Well Construction Details

WELL NO.	DATE INSTALLED	CASING AND SCREEN DIAMETER (inches)	TOTAL DEPTH (feet bgs)	SCREENED INTERVAL (feet bgs)	SAND PACK (feet bgs)	BENTONITE PELLETS (feet bgs)	CEMENT GROUT (feet bgs)	MEASURING POINT (feet als)
MW-1	8/8/88	4	25	15-25	14-25	12-14	0-12	2.76
MW-2	8/9/88	4	21	5-20	3-21	2-3	0-2	FLUSH
MW-3	8/9/88	4	20	5-20	3-20	2-3	0-2	2.14

Note:
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bgs - below ground surface
als - above land surface

NJ1533CR1/mwcon

Table 3: Summary of Water-Level Elevation Data

WELL NO	ELEVATION of MP (feet asl)	GROUND ELEVATON (feet asl)	August 10,1988 DTW BMP	August 10,1988 W-L ELEVATION (feet asl)	August 30, 1988 DTW BMP	August 30, 1988 W-L ELEVATION (feet asl)	September 28,1988 DTW BMP	September 28,1988 W-L ELEVATION (feet asl)	October 25, 1988 DTW BMP	October 25, 1988 W-L ELEVATION (feet asl)
MW-1	67.16	64.40	11.41	55.75	12.03	55.13	12.77	54.39	13.99	53.17
MW-2	63.58	63.85	5.92	57.66	5.72	57.86	6.44	57.14	7.15	56.43
MW-3	66.54	64.40	11.10	55.44	11.62	54.92	12.19	54.35	13.34	53.20
SUMP	64.09	64.09	NA	NA	6.50	59.42	6.50	57.69	DRY	NA

Note:

MP - Measuring Point
asl - above sea level
W-L - Water - Level
NA - not available

NJ1533CR1/wlelev

Table 4: Analytical Parameters for Ground-Water Samples

Parameters analyzed for included:

Benzene
Toluene
Ethylbenzene
o,m,p - xylenes

Napthalene
Methylnapthalene
Alkylbenzenes: trimethylbenzenes
butylbenzenes
p - cymene
methyl
ethylbenzenes
Alkylcyclohexanes

pH, spec conduct, Temp

Note:

All water samples were analyzed for volatile organics and base/neutrals using USEPA methods 624 and 625, in accordance with the NJDEP-BUST Scope of Work.

NJ1533CR1/parameters

Table 5: Concentrations of Volatile Organic and Base/Neutral Compounds in Ground-Water Samples

PARAMETER	MW-1	MW-2	MW-3	REP MW-3	SUMP	FIELD BLANK	TRIP BLANK
VOCs (ppb)							
Chloroform	4.4J	ND	ND	ND	ND	ND	ND
Ethane,1-1-oxybis	ND	8.6	ND	ND	ND	ND	ND
BASE/NEUTRALS (ppb)							
Bis (2-ethylhexyl) phthalate	ND	2.7J	2.1J	9.7J	1.1J	2.6	NA
Pyrene	ND	ND	ND	ND	0.3J	ND	NA
Phenol,2,4-bis (1,1-dimethylethyl)	ND	ND	ND	ND	ND	33	NA
Phenol,2,6-bis (1,1-dimethyl)-4-methyl	ND	ND	ND	ND	ND	6.1	NA

Note:

VOCs - Volatile Organic Compounds
ppb - parts per billion
ND - parameter analyzed for not detected
J - parameter detected below specified minimum detection limits
NA - parameter not analyzed
REP - replicate

J1533CR1/gwqual

FIGURES

N

0 2000 4000

SCALE FEET

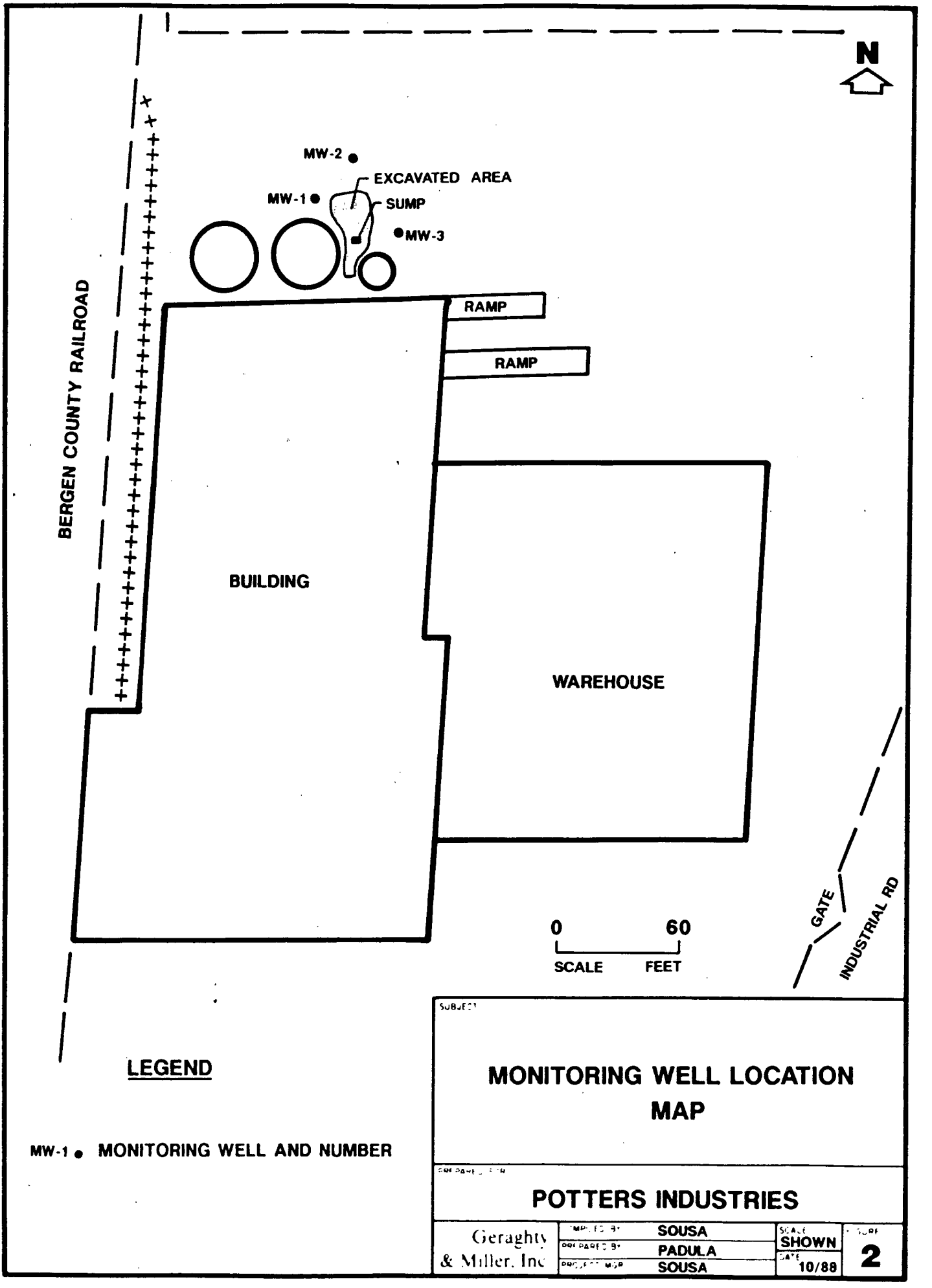
SITE LOCATION MAP

SUBJECT

PREPARED FOR

POTTERS INDUSTRIES

Geraghty & Miller, Inc.	COMPILED BY: SOUSA	SCALE: SHOWN	FIGURE: 1
	PREPARED BY: PADULA	DATE: 10/88	
	PROJECT MGR: SOUSA		

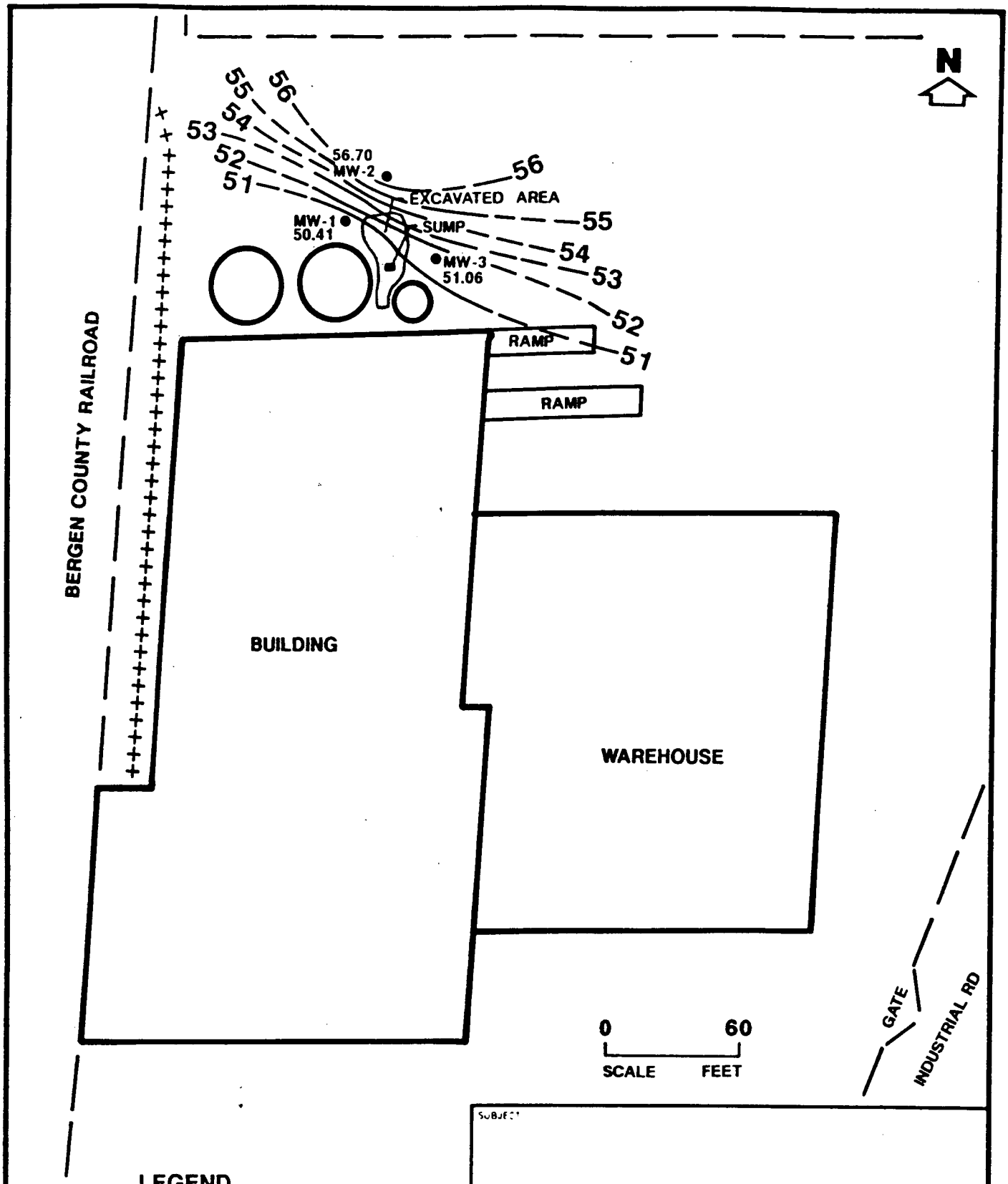


SUBJECT

MONITORING WELL LOCATION MAP

POTTERS INDUSTRIES

Geraghty & Miller, Inc	SUPERVISED BY: SOUSA	SCALE: SHOWN	SHEET: 2
	PREPARED BY: PADULA	DATE: 10/88	
	PROJECT MGR: SOUSA		



LEGEND

MW-1 ● MONITORING WELL AND NUMBER

50.41 WATER-LEVEL ELEVATION (FEET)

52— LINE OF EQUAL WATER-LEVEL ELEVATION (FEET) DASHED WHERE INFERRED

SUBJECT

WATER-LEVEL CONTOUR MAP

OCTOBER 25, 1988

POTTERS INDUSTRIES

Geraghty & Miller, Inc	SOUSA	SHOWN	3
	PADULA		
	SOUSA	10/88	

APPENDIX A

New Jersey Department of Environmental Protection
Bureau of Underground Storage Tank
Scope of Work

revised 6/04/88

DRAFT

New Jersey Department of Enviornmental Protection
Division of Water Resources

SCOPE OF WORK

INVESTIGATION AND CORRECTIVE ACTION REQUIREMENTS FOR DISCHARGES FROM UNDERGROUND STORAGE TANK AND PIPING SYSTEMS

INTRODUCTION

Following is a list of requirements to be met by the owner when a discharge occurs from an underground storage tank or piping system. These requirements will enable the owner to proceed with the investigation and cleanup of free product from a discharge without waiting for specific instructions or approvals from the New Jersey Department of Environmental Protection (the Department). The procedures are intended to be implemented by the hydrogeologic contractor and licensed professional engineer retained by the owner or operator. The Department will review the results of the investigation and determine the need for further corrective actions.

SECTION I - REPORTING REQUIREMENTS

Agencies responsible for public health and welfare and the environment must be kept informed of developments so as to protect the public and the environment and respond to public concerns. At a minimum:

1 Notify the Department's Environmental Action Hot-Line (609-292-7172) of the discharge.

2 Notify the local health department of the discharge.

3 If a vapor hazard exists, notify the local fire department, local health department and the Department's representative specified in the cover letter.

4 If public or private supply wells are contaminated or surface water supply intakes are nearby, notify the local health department and the Department's representative specified in the cover letter.

5. A schedule of activities shall be submitted to the local health department and the Department's represnetative specified in the cover letter prior to implementation. The schedule must include the following:

Date of tank or piping removal
Date(s) of well installation
Date(s) of sample collection

6. Discharge Investigation and Corrective Action Report (DICAR)

Within 120 days of discovery of the discharge, submit all results of work required in Sections III and IV to the Department's representative specified in the cover letter, and to the local health department. Also supply a certification, signed by a licensed Professional Engineer, stating that results of the DICAR are representative of conditions at the site. Pending review of the DICAR results, further corrective action requirements may be required by the Department.

7. A directory of some of the Department's agencies is contained in Appendix ____ for reference.

SECTION II - HEALTH AND SAFETY PROCEDURES

All investigations and corrective actions shall be undertaken in a manner consistent with EPA Standard Operating Safety Guides and OSHA health and safety practices (29 CFR Part 1910). Proper health and safety procedures are particularly important while investigating and remediating vapor hazards.

SECTION III - IMMEDIATE CORRECTIVE ACTION REQUIREMENTS FOR DISCHARGES TO THE ENVIRONMENT

When a discharge into the environment has occurred, the owner or operator of an underground storage tank system shall take immediate action to stabilize the situation by conducting the following activities:

1. Determine the source of the discharge. The "source" is defined as the leaking tank, line, pump island or overfill location.

2. Cease use of the underground storage tank system involved in the discharge.

3. Mitigate any fire, safety or health hazard including, but not limited to, hazards from combustible vapors, elimination of ignition sources, and vapor inhalation hazards.

   Vapor infiltration into structures must be remediated upon discovery. This is particularly important for vapors that pose explosive risks. Air monitoring shall be conducted using appropriate instruments as a screening device. In addition, where chronic vapor hazards are suspected, air samples may have to be collected following standard OSHA or industrial hygiene collection procedures and analyzed using NIOSH analytical procedures.

4. Conduct an inspection to detect any above-ground discharge, (including product in subsurface utilities) and where any discharge is evident, mitigate the effects of the discharge.

5. Properly remove all hazardous substances from the underground storage tank system involved in the discharge and repair, replace or close the system. Closure requires a permit from the local construction official. Waste oil and tank bottom sludges are regulated as hazardous waste in New Jersey and must be handled in accordance with N.J.A.C 7:26-1,4,7-13A. Owners or operators must retain receipts of hazardous waste shipments.

SECTION IV - DISCHARGE MITIGATION REQUIREMENTS

In addition to the immediate corrective actions required, the owner or operator of an underground storage tank system which has discharged hazardous substances shall do the following:

A. Site Characterization

1. Canvass the neighborhood surrounding the discharge site and list nearby private/domestic well locations within 1000 feet. List locations of municipal/public supply wells within 2500 feet of the site. Also, locate basements, subsurface utilities (ie storm/sanitrary sewers, telephone conduits and cable vaults, surface water bodies (lakes, ponds, streams, rivers) and wetlands. Show all information on an area-wide plan.

2. Check for evidence of the discharged substance including sheens, free product, and vapors in nearby basements, cable vaults, sewers, and supply wells.

3. Prepare a detailed site plan. This is to show monitoring wells, active and abandoned tankfields, pump islands, vent pipes, floor drains, septic system/fields, dry wells, water supply wells, sanitary sewer lines, storm sewer lines, and below-grade utility lines. Depth of installation must be included for underground structures.

4. Provide Underground Storage Tank registration numbers for each tank. All regulated tanks must be registered with the Department as per N.J.A.C. 7:14B-2

5. List the age, size, and type of construction for active and abandoned tanks and piping. List all contents of past and present tanks. This information must be collected and submitted for all tanks including waste oil, fuel oil, kerosene, diesel, gasoline, and other hazardous substances.

6. If the source (ie the leaking tank, line, pump island or overfill location) of contamination is not known, the following information (a, b, c, d) shall be collected:

a) Determine if tanks and lines have been replaced, removed, repaired, relined or abandoned in place.

b) Count the number of vent pipes present for comparison with the total number of tanks at the site. Abandoned vent lines may be used to locate abandoned tanks and locations of removed tnaks. However, newer tanks may be manifolded into a common vent line.

c) Check garage and shops for floor drains. Open the grates and the oil/water separators to check for evidence of product. Determine the discharge point of the floor drains. Discharge to on-site systems (seepage pits, septic tanks, or dry well) is considered an industrial discharge to ground water and must be permitted under the New Jersey Pollutant Discharge Elimination System (NJPDES). Provide NJPDES numbers for disposal sites. If permits have not been obtained, contact the Bureau of Ground Water Discharge control.

d) Inspect property for signs of previously removed tanks (ie settlement in pavement, scars in pavement, new asphalt patches, etc.) These areas should be targeted for investigation including a monitoring well.

B. Soil Remediation

Decisions on soil removal/remediation should be made in concert with ground water quality information at the site. It is advantageous to collect water quality information before embarking on a soil removal or remediation program.

1. Record and report the presence of any odors, free product, sheens and water during excavation and removal of tanks or piping to the Department and local health department in the DICAR.

2. Remove free product contaminated soils and any free product from beneath the tank excavation and piping (if removed). Field determination of "free product contaminated soils" may be used (Appendix ____).

3. Soils that are removed should be stockpiled onsite and classified for disposal purposes. Soils should bestaged in such a manner that the soil is completely isolated from the environment and any hazardous materials in the soil are prevented from contact with or release into the environment. Soils must be sampled and analyzed prior to disposal. Test requirements and the results of this analysis for waste classification purposes must be coordinated through the Bureau of Regulation, classification and Technical Assistance.

   Soils may also be treated in-situ or onsite with approval from the Department.

4. The Department will determine the need for more extensive soil investigation and soil remediation (beyond free product contaminated soils) based on the following criteria:

   a) the potential for direct contact with contaminated soils now or in the future

   b) vapor hazards and ground water pollution hazard posed by the soils now and in the future

   c) the presence or absence of ground water contamination

5. Soils that pose direct contact hazards should be removed. (i.e. spillage around waste oil tank fill pipes).

6. Contaminated soils resulting from recent surface or subsurface spillage that pose a risk to ground water quality should be removed or otherwise remediated.

7. Backfill the excavation with clean fill. If a low permeability cap was previously covering the excavation (cement, asphalt, etc.) a cap of similar low permeability material should cover the excavation following backfilling.

8. Soil sampling procedures shall follow the Division of Hazardous Site Mitigation's field sampling procedures manual. All samples must be analyzed by a laboratory certified pursuant to N.J.A.C. 7:18. All sampling data must be reviewed in accordance with the procedures outlined in USEPA's Manual "Testing Methods for Evaluating Solid Waste" (SW-846 Third Edition) and 40 CFR Part 136 to assure proper data quality.

C. Evaluation of Subsurface Conditions

1. Monitoring wells must be installed to evaluate the impact of a facility on ground water. The horizontal and vertical extent of ground water contamination shall be defined to Department corrective action levels. Offsite drilling may therefore be required. Judgements about water quality shall not be inferred from results of tank tests or soil samples alone.

2. Nearby residental and public supply wells shall be sampled and analyzed. Analyses must be targeted to the substance released (Appendix ____).

3. In some cases (particularly vapor impacts), if a shallow water table may reach the level of below-grade lines and building footings, the backfill may have to be excavated and inspected to evaluate potential for preferential migration of product along these conduits.

4. GROUND WATER MONITORING REQUIREMENTS

The "source" is defined as the leaking tank, line, pump island or overfill location). Ground water monitoring requirements will vary depending on whether the source of the discharge in the tank system is known or unknown as described below:

Source Known

a) If ground water is encountered during removal of the leaking tank or piping, a monitoring well shall be placed into the excavation before backfilling.

b) If ground water was not encountered during excavation of the leaking tank or piping, a monitoring well must be sited downgradient and within 10 feet of the source

"Downgradient" should be predicted based on relief, location of surface water bodies, structural controls in bedrock, location of pumping wells, and subsurface conduits at or below the water table. The well shall monitor the first water encountered. The well should extend about 5 feet into the water table with sufficient screen above the water table to detect free product (assuming the stored substance is less dense than water). A well should not be drilled however through the backfill of an active tank. In locating

the well(s) consideration should be given to the proximity and direction of water supply wells, structures, or surface water bodies that may be impacted.

c) The number of Monitoring Wells required shall be based on the following criteria:

*One Tank up to 20 feet in Length - 1 well/tank

*Pump Island - 1 well/island

*Tank Field (Gasoline Retail Outlet with 3 tanks in Field) - 2 wells

Appendix ___ shows hypothetical site plans that will assist in siting of monitoring wells.

d) Ground water flow direction shall also be determined . A minimum of three monitorng wells is required in this regard.

Source Unknown

a) If the exact location of the discharge in the tank system is unknown or there is concern that other components of the system may have discharged, then a monitoring well shall be installed within 10 feet of the downgradient edge of each potential source (defined as the tanks, lines, pump islands and/or overfill locations).

b) Ground water flow direction shall be determined as described above.

Other requirements for Ground Water Monitoring

a) Actual number of wells for a particular site is subject to a number of factors. In some cases a well installed to monitor ground water near a tank may also serve to monitor ground water near piping of the tanks. A pump island may be located in close proximity to a tank and both may be able to be monitored with the same well.

b) Monitoring well design shall follow the Department's monitoring well specifications (Appendix A). Modificaitons to these specificaitons shall be allowed at the discretion of the Department.

c) Installation of monitoring wells outside the tank excavation, or that exceed the depth of the excavation should be overseen by a qualified hydrogeologist with experience in ground water pollution investigations.

d) For stored substances with densities greater than water, the well screen should extend 15 feet into the saturated zone or to the 1st confining unit based on judgement of the hydrogeologist.

e) Continuous Split Spoon sampling shall be conducted on the first well to characterize stratigraphy.

f) Any boring not completed as a well must be sealed using cement or bentonite grout.

5. Ground elevation, top of casing elevation, top of screen elevation, static water level, ground-water elevation, product level, and product thickness must be measured and submitted in tabular form for each monitoring well. Product and water level measurements must be to the nearest 0.01 foot.

6. All monitoring wells must be sampled and the water analyzed by a NJDEP certified laboratory using the appropriate analytical protocol. (Appendix __). Water samples shall be collected following procedures in the Division of Water Resources Field Procedures Manual for Water Data Aquisition.

7. Construct ground-water elevation contour maps. Water levels corrected for the presence of free product should be used with caution, in conjunction with water elevation from wells that are free of product.

8. If free product exists in the wells, construct an isopleth map of free product thickness. Appropriate concentration isopleth maps should be constructed for water soluble phase components.

9. Should a discharge be in close proximity to a surface-water body, staff gauges must be installed so that surface water elevations can be incorporated into the water-table contour map. the elevation of any nearby wetland areas must be included.

D. Corrective Action - Free Product Recovery

1. If free product is detected, the horizontal limits of free product must be defined in the initial phase of drilling. Monitoring wells shall be established around the discharge area that do not contain free product.

2. Any recovery or containment system must demonstrate hydraulic control over the free and dissolved product.

3. Free product recovery must be implemented as soon as possible after free product has been detected.

4. Aquifer pumping test should be performed as necessary to assist in the design of the recovery system. Determine the specific capacity of the well(s) to be pump tested along with the maximum sustainable yield. Even if the monitoring wells yield insufficient discharge for an aquifer pumping test, sustainable yield and specific capacity must be determined for a minimum of two wells. The recovery system must demonstrate hydraulic control over the contaminated ground water.

5. Records of product recovery and ground-water pumpage must be kept. Static water levels and product thickness must be taken on a monthly basis. If a vapor problem or free product exists, weekly monitoring of water level and product thickness will be necessary. For each set of measurements, construct ground water elevation contour maps, free-product isopleth maps, and appropriate isopleth maps for water soluble phase components.

6. All electrical equipment, and storage containers used in the process of the investigation and the corrective action must conform with all Federal, State, and local fire codes.

7. Appropriate permits and approvals must be obtained for discharge of ground water, both treated and untreated, and for vapors. Emergency approvals for discharge of vapors and treated water will be issued on a case-by-case basis. Air discharge permits can be obtained from the Bureau of New Source Review. NJPDES Permits are issued by the Bureau of Ground Water Discharge Control. A document listing required permits for the Department can be secured from the Office of Business Advocacy, Department of Commerce and Economic Development. This document is entitled "Directory of State Programs for Regulating Costruction."

8. Further corrective actions beyond free product removal may be required by the Departmnet after review of the results of the DICAR.

Appendix 1

APPENDIX I

Agency Directory

Division of Water Resources - Enforcement

FUNCTION: This agency enforces the Water Pollution Control Act and the Underground Storage of Hazardous Substances Act. The agency also serves a case management function on ground water pollution cases. DWR-Enforcement has four field offices:

Central Region - Burlington, Mercer, Middlesex, Monmouth and Ocean Counties

Twin Rivers Professional Building
East Windsor, NJ 08520
609 -426-0786

Metro Region - Bergen, Essex, Hudson, and Union Counties

2 Babcock Place
West Orange, NJ 07052
201-669-3900

Northern Region - Sussex, Warren, Hunterdon, Passaic, Morris Counties

1259 Route 46, Bldg. No. 2
Parsippany, NJ 07054
201-299-7592

Southern Region - Cape May, Salem, Cumberland, Atlantic, Gloucester, Camden Counties

20 East Clementon Road
The Paint Works
Gibbsboro, NJ 07054
609-346-8032

Bureau of Ground Water Discharge Control

NJ Department of Environmental Protection
Division of Water Resources
Ground Water Quality Management Element
401 E. State St.
Trenton, NJ 08625
609-292-0424

Function: This Bureau provides hydrogeologic support to DWR-Enforcement and is responsible for issuance of ground water discharge permits through NJPDES

Bureau of Industrial Waste Management
Divison of Water Resources
NJDEP
401 E. State St.
Trenton, NJ 08625
609-292-4860

FUNCTION: This bureau is responsible for the issuance of discharge permits to surface waters and pretreatment permits for discharge to sanitary sewers

Bureau of New Source Review
Engineering and Technology Element
Division of Environmental Quality
NJDEP
CN-027
401 E. State St.
Trenton, NJ 08625
609-292-6716

FUNCTION: This Bureau is responsible for the issuance of air discharge permits

Bureau of Regulatory Classification and TEchnical Assistance
Hazardous Waste Regulation
Division of Waste Mgt.
NJDEP
401 E. State St.
Trenton, NJ 08625
609-292-8341

FUNCTION: Provides guidance on soil classification for disposal

Bureau of Safe Drinking Water
Water Supply and Watershed Mgt. Element
Division of Water Resources
NJDEP
401 E. State St.
Trenton, NJ 08625
609-984-7945

FUNCTION: This Bureau is responsible for providing recommendations for acceptable quality of drinking water supplies.

Bureau of Underground Storage Tanks
Division of Water Resources
Ground Water Quality Mgt Element
NJDEP
401 E. State St.
Trenton, NJ 08625
609-984-3156

FUNCTION: This Bureau is responsible for the registration and regulation of underground storage tanks

Bureau of Water Allocation - Well Permit Section
Water Supply and Watershed Mgt Element
Division of Water Resources
NJDEP
401 E. State Street
Trenton, NJ 08625
609-984-6831

FUNCTION: This Bureau is responsible for issuing well permits and water diversion permits.

Bureau of Water Supply
Water Supply and Watershed Mgt.
Division of Water Resources
NJDEP
401 E. State
Trenton, NJ 08625
609-984-5862

Trenton Dispatch

609-292-7172

FUNCTION: This agency is responsible for receiving reports of discharges from undergorund storage tanks and piping.

Underground Storage Tank Registration Information

1-800-722-TANK

Appendix II

MONITORING WELL CONSTRUCTION AND GROUTING SPECIFICATIONS

SAMPLING AND ANALYTIC/ "ETHODS FOR: KEROSENE, JET FUELS, DIESEL FUELS, NO. THRU 6 HEATING OILS IN WATER

SAMPLE COLLECTION:

Water samples ..ould be collected within two feet of the static water level in the well.

Check for free product and sheens on the water surface in the well.

Follow NJDEP guidelines for collection, preservation and transport of water samples for volatile organics analysis

TARGET COMPOUNDS:

Benzene
Toluene (BTEX)
Ethylbenzene
o,m,p-xylenes

Napthalene
Methylnapthalene
Alkylbenzenes (e.g. trimethylbenzenes, butylbenzenes, p-cymene, methyl, ethylbenzenes)
Alkylcyclohexanes

ANALYTICAL METHODS:

EPA Method 624 + 15 (GC/MS plus identification of non-targeted compounds) allow compounds to elute for 40 minutes.

Other methods may be used with prior NJDEP approval (e.g. EPA Method 503.1)

NOTE: Additional water soluble components have been identified using EPA MEthod 625 + 15 (base/neutrals)

Report the presence of unknown peaks

Submit copy of chromatogram with results

REFERENCE:

Kramer,W. and Hayes, T., 1987, Water Soluble Phase of Number 2 Fuel Oil: Results of a Laboratory Mixing Experiment, New Jersey Geological Survey Technical Memorandum 87-4.

SAMPLING AND ANALYTICAL METHODS FOR GASOLINE IN WATER

SAMPLE COLLECTION:

Water samples should be collected within two feet of the static water level in the well.

Check for free product or sheens on the water surface of the well.

Follow NJDEP guidelines for collection, preservation and transport of water samples for volatile organic analysis.

TARGET COMPOUNDS

Benzene
Toluene (BTEX)
Ethylbenzene
o,m,p-xylenes

1,2-dichloroethane
Methyl tertiary butyl ether (MTBE)
Tertiary butyl alcohol (TBA)
Methanol

ANALYTICAL METHODS

EPA Method 624 (GC/MS)

EPA Method 602 (GC) for BTEX ONLY

Other methods may be used with prior NJDEP approval

Report the presence of unknown peaks

Submit copy of chromatogram with results

REFERENCE:

Kramer,W. and Hayes,T., 1987, Water Soluble Phase of Gasoline: Results of a Laboratory Mixing Experiment, New Jersey Geological Survey Technical Memorandum 87-5.

Appendix 4

METHOD 2 FIELD SORPTION METHOD

This method is used to sorb free product from contaminated soils. A sample of the soil/fill is pressed against a brown paper bag for about 10 seconds. Soils contaminated by free product result in staining of the bag. The stain is more pronounced with fuel oils than for gasoline. Due to rapid volatilization of gasoline from the bag the observer must check for evidence of staining from gasoline quickly, before it volatilizes from the paper. Interference from soil moisture may result in water transfer to the bag but generally the water does not spread on the bag as does fuel oil or gasoline . This method should be supplemented with the soil/water agitation method.

APPENDIX ____

FIELD METHODS FOR DETERMINATION OF FREE PRODUCT CONTAMINATED SOILS

The two methods proposed below can be used in the field to make a cut between soils contaminated with free product (soils at residual saturation) and soils that are contaminated with dissolved product or are clean.

These field methods allow the owner/operator to make a rapid field determination of "worst case" soil contamination eliminating delays in installation/removal and backfilling of underground tanks and piping.

These methods are only applicable to petroleum fuels (gasoline, and heating oils) and some lubricants (ie motor oil). In addition, the methods are only intended to seperate out free product contaminated soils from other soils which may also be contaminated although at a lower concentration. The need for further soil remediation beyond free product contaminated soils shall be based on results of ground water sampling at the site. If ground water cleanup is necessary, remediation of dissolved product contaminated soils may be necessary.

"Soil Remediation" may consist of removal and offsite disposal or a method of onsite or in place treatment of the soils acceptable to the Department. (e.g. subsurface venting of gasoline contaminated soils). Dissolved product contaminated soils that pose a future risk to ground water quality (e.g. a discharge that has not had sufficient time to reach ground water) must be remediated beyond free product contaminated soils.

METHOD 1 -- SOIL / WATER AGITATION

A clear jar is partially filled with the soil/fill sample. Sufficient water is added to saturate the soil and bring the water level to about 1 cm above the soil surface. The sample is agitated by shaking and the jar is then opened to check for the presence of a sheen on the water surface. If a sheen is present, the soils have been contaminated by free product. If no sheen is present, the soils are either contaminated with dissolved product or are free of contamination. The presence of a sheen should be checked under various lighting conditions and backgrounds since these factors will affect the visibility of the sheen. Obviously, this method should only be used with products that exhibit visible sheens in water. This method should be used in conjunction with Method 2 below.

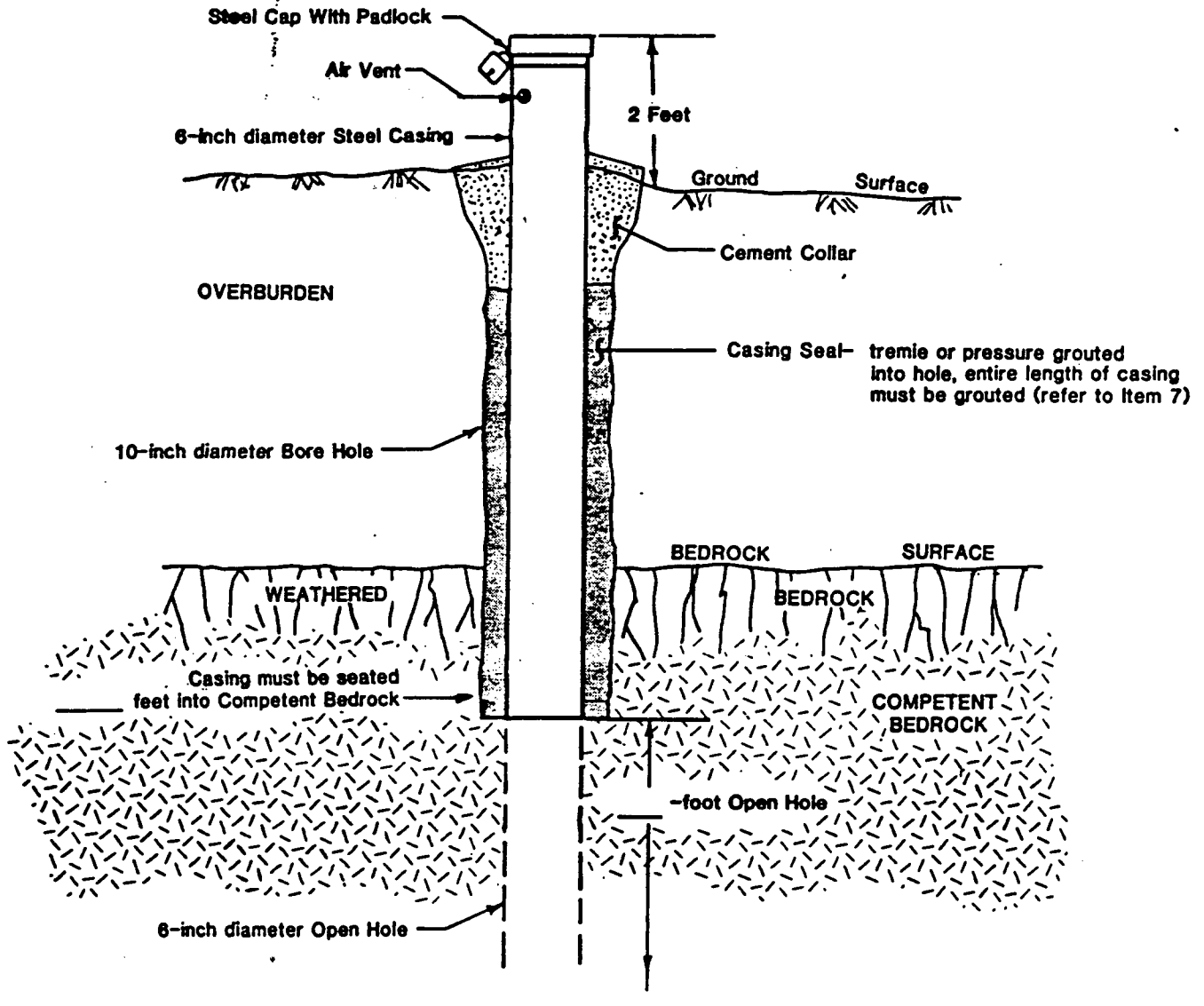
APPENDIX 3

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
MONITOR WELL SPECIFICATIONS FOR
BEDROCK FORMATIONS

SITE NAME : _____

LOCATION : _____

DATE : _____



NOT TO SCALE

NJGS Revised 9-87

rev. 9/87

BEDROCK MONITORING WELL REQUIREMENTS

1. Notification to the NJDEP is required two weeks prior to drilling.
2. State well permits are required for each monitoring well constructed by the driller. The well permit tag must be permanently affixed to each monitoring well.
3. Copies of the site specific well specifications must be maintained at the drilling site by the driller.
4. The monitoring well must be installed by a New Jersey licensed well driller.
5. Monitoring well design must conform with NJAC 7:9-7, 8, and 9.
6. Drill an oversize borehole a minimum of 4 inches greater than the casing diameter through the overburden and bedrock so that the casing can be sealed into competent rock as indicated in the diagram.
7. Acceptable grouting materials are:

   Neat Cement - 6 gallons of water per 94 pound bag of cement.

   Granular Bentonite - 1 gallon of water per 1.5 pounds of bentonite.

   Cement-Bentonite - 8 gallons of water to 5 pounds of bentonite dry mixed per 94 pound bag of cement.

   Cement-Bentonite - 10 gallons of water per 8 pounds of bentonite water-mixed with a 94 pound bag of cement.

   Non-expandable cement - 7.5 gallons of water per 1/2 teaspoon of aluminum hydroxide mixed with 4 pounds of bentonite and 94 pounds of cement.

   Non-expandable cement - 7 gallons of water per 1/2 teaspoon of aluminum hydroxide mixed with 94 pounds of cement (Type I or Type II).
8. Potable water must be used for mixing grouting materials and drilling fluids.
9. Only threaded or welded joints are acceptable as couplings.
10. The driller must maintain an accurate written log of all materials encountered, record construction details for each well, and record the depth of water bearing zones. This information must be submitted to the Bureau of Water Allocation as required by N.J.S.A. 58:4A.
11. Flush mount monitoring wells are acceptable provided they have manholes, locking caps, and seals to prevent leakage of surface water into the well.
12. Top of each well casing (excluding cap) must be surveyed to the nearest 0.01 foot by a New Jersey licensed surveyor. The survey point must be marked on each well.
13. Wells must be developed to a turbidity-free discharge.
14. Modifications to designs are allowed only with NJDEP approval.

Additional requirements (if checked):

Rock core samples ( ) _____

Split spoon samples ( ) _____

Borehole geophysical logs ( ) _____

Dedicated bailer (sampler) in well ( )

Other ( ) _____

_____

_____

_____

Notice is hereby given of the following:

Review by the Department of well locations and depths is limited solely to review for compliance with the law and Department rules.

The Department does not review well locations or depths to ascertain the presence of, nor the potential for, damage to any pipeline, cable, or other structures.

The permittee (applicant) is solely responsible for the safety and adequacy of the design and construction of monitoring well(s) required by the Department.

The permittee (applicant) is solely responsible for any harm or damage to person or property which results from the construction or maintenance of any well; this provision is not intended to relieve third parties of any liabilities or responsibilities which are legally theirs.

rev. 9/87

MONITORING WELL CONSTRUCTION AND GROUTING SPECIFICATIONS FOR UNCONSOLIDATED FORMATIONS

1. Notification to the NJDEP is required two weeks prior to drilling.
2. State well permits are required for each monitoring well constructed by the driller. The well permit tag must be permanently affixed to each monitoring well.
3. Copies of the site specific well specifications must be maintained at the drilling site by the driller.
4. The monitoring well must be installed by a New Jersey licensed well driller.
5. Monitoring well design must conform with NJAC 7:9-7, 8, and 9.
6. The borehole diameter must be a minimum of 4 inches greater than the casing diameter.
7. Acceptable grouting materials are:

   Neat Cement - 6 gallons of water per 94 pound bag of cement.

   Bentonite - 1 gallon of water per 1.5 pounds of bentonite.

   Cement-Bentonite - 8 gallons of water to 5 pounds of bentonite dry mixed per 94 pound bag of cement.

   Cement-Bentonite - 10 gallons of water per 8 pounds of bentonite water-mixed with a 94 pound bag of cement.

   Non-expandable cement - 7.5 gallons of water per 1/2 teaspoon of aluminum hydroxide mixed with 4 pounds of bentonite and 94 pounds of cement.

   Non-expandable cement - 7 gallons of water per 1/2 teaspoon of aluminum hydroxide mixed with 94 pounds of cement (Type I or Type II).
8. Potable water must be used for mixing grouting materials and drilling fluids.
9. Only threaded joints are acceptable as couplings.
10. The driller must maintain an accurate written log of all materials encountered, record construction details for each well, and record the depth of water bearing zones. This information must be submitted to the Bureau of Water Allocation as required by N.J.S.A. 58:4A.
11. A length of protective steel casing with a locking cap must be securely set in cement around the well casing. Flush mount monitoring wells are acceptable provided they have manholes, locking caps, and seals to prevent leakage of surface water into the well.
12. Top of each well casing (excluding cap) must be surveyed to the nearest 0.01 foot by a New Jersey licensed surveyor. The survey point must be marked on each well.
13. Wells must be developed to a turbidity-free discharge.
14. Modifications to designs are allowed only with NJDEP approval.

Additional requirements (if checked):

Split spoon samples ( ) _____

Borehole geophysical logs ( ) _____

Top of screen set _____ feet above/below water table

Dedicated bailer (bampler) in well ( )

Other ( ) _____

_____

_____

_____

Notice is hereby given of the following:

Review by the Department of well locations and depths is limited solely to review for compliance with the law and Department rules.

The Department does not review well locations or depths to ascertain the presence of, nor the potential for, damage to any pipeline, cable, or other structures.

The permittee (applicant) is solely responsible for the safety and adequacy of the design and construction of monitoring well(s) required by the Department.

The permittee (applicant) is solely responsible for any harm or damage to person or property which results from the construction or maintenance of any well; this provision is not intended to relieve third parties of any liabilities or responsibilities which are legally theirs.

APPENDIX B

Hazardous Waste Classification Laboratory Report

ENVIROTECH RESEARCH, INC.

777 New Durham Road
Edison New Jersey 08817
(201) 549-3900

July 25, 1988

Geraghty & Miller
7 Atlantic Street
Hackensack, NJ 07601

Attention: Ms. Doreen Sousa

Dear Ms. Sousa:

Enclosed are the results you requested for the following samples taken 07/15/88 at Potters Industries, DEP reference # 8807111550.:

Lab No.	Client ID	Analysis Requested
18407	SP-1	ID 27
18408	SP-2	ID 27

An invoice for our services is also enclosed. Please call me at 549-3900 if you have any questions.

Very truly yours,

Michael J. Urban
Laboratory Manager

ENVIROTECH RESEARCH, INC.

777 New Durham Road
Edison, New Jersey 08817
(201) 549-3900

July 25, 1988

Geraghty & Miller
7 Atlantic Street
Hackensack, NJ 07601

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18408	SP-2	ID 27

An invoice for our services is also enclosed. Please call me at 549-3900 if you have any questions.

Very truly yours,

Michael J. Urban
Laboratory Manager

TABLE OF CONTENTS

Analytical Methodology Summary

Volatile Organics:

Water samples are analyzed for volatile organics by purge and trap GC/MS as specified in U.S. EPA Method 624. Solid samples are analyzed for priority pollutant volatile organics as specified in the U.S. EPA publication "Test Methods for Evaluating Solid Waste" (SW-846, 3rd Edition) Method 8240.

Acid and Base/Neutral Extractable Organics:

Water samples are analyzed for acid and/or base/neutral extractable organics by GC/MS in accordance with U.S. EPA Method 625. Solids are analyzed for acid and/or base/neutral extractable priority pollutants as specified in the U.S. EPA publication "Test Methods for Evaluating Solid Waste" (SW-846, 3rd Edition) Method 8270.

Organochlorine Pesticides and PCBs:

Water samples are analyzed for organochlorine pesticides and PCBs by dual column gas chromatography with electron capture detectors as specified in U.S. EPA Method 608. Solid samples are analyzed as specified in the U.S. EPA publication "Test Methods for Evaluating Solid Waste" (SW-846, 3rd Edition) Method 8080.

Priority Pollutant Metals:

Metals analyses in water are performed by atomic absorption using EPA methods presented in "Methods for Chemical Analysis of Water and Wastewater" (EPA 600/4-79-020). Solid sample analyses are conducted as specified in the EPA publication "Test Methods For Evaluating Solid Waste" (SW-846, 3rd Edition). Specific Method references are as follows:

Parameter	Water Method	Solid Method
Antimony	204.2	7041
Arsenic	206.2	7060
Beryllium	210.1	7090
Cadmium	213.1	7130
Chromium	218.2	7191
Copper	220.1	7210
Lead	239.2	7421
Mercury	245.0	7470
Nickel	249.1	7520
Selenium	270.2	7740
Silver	272.1	7760
Thallium	279.2	7841
Zinc	289.1	7950

Cyanide:

Water samples are analyzed for cyanide using U.S. EPA Method 335.2. cyanide is determined in solid samples as specified in the U.S. EPA, Contract Laboratory Program IFB dated October 1986.

Phenolics:

Water samples are analyzed for phenolics using U.S. EPA Method 420.1. Phenolics are determined in solid samples by preparing the sample as outlined in the U.S. EPA, Contract Laboratory Program IFB for cyanide, followed by a phenols determination using EPA Method 420.1.

Petroleum Hydrocarbons:

Water samples are analyzed for total petroleum hydrocarbons by I.R. using U.S. EPA Method 418.1. Solid samples are prepared for analysis by soxhlet extraction consistent with SW-846 Method 3540, as modified by the Draft "N.J. DEP ECRA Sampling Plan Guide", Attachment 2 page 9, and analyzed by U.S. EPA Method 418.1.

GC/MS Nontarget Compound Analysis:

Analysis for nontarget compounds is conducted, upon request, in conjunction with GC/MS analyses by U.S. EPA Methods 624, 625, 8240 and 8270. Nontarget compound analysis is conducted using a forward library search of the EPA/NIH/NBS mass spectral library of compounds at the greatest apparent concentration (10% or greater of the nearest internal standard) in each organic fraction (15 for volatiles, 15 for base/neutrals and 10 for acid extractables).

Miscellaneous Parameters:

Additional analyses performed on both aqueous and solid samples are in accordance with methods published in the following references:

- Test Methods for Evaluating Solid Wastes, SW-846 3rd Edition, November 1986.
- Standard Methods for the Examination of Water and Wastewater, 16th Edition.
- Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, 1979.

DATA REPORTING QUALIFIERS

ND - The compound was not detected at the indicated concentration.

B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.

ENVIROTECH RESEARCH, INC.

Geraghty & Miller
7 Atlantic Street
Hackensack, NJ 07601
Attention: Ms. Doreen Sousa

Report Date: 7/25/88
Job No.: 4282
N.J. Certified Lab No. 12543

HAZARDOUS WASTE CHARACTERISTICS ANALYSIS

EP-Toxicity Parameter	Lab No. 18407 Client ID: SP-1 Result (mg/l)	Maximum Conc. (mg/l)	Detection Limit (mg/l)
Arsenic	ND	5.0	0.01
Barium	ND	100	2.0
Cadmium	ND	1.0	0.02
Chromium	ND	5.0	0.2
Lead	ND	5.0	0.2
Mercury	ND	0.2	0.0002
Selenium	ND	1.0	0.01
Silver	ND	5.0	0.02

Parameter	Result (mg/kg)	Maximum Conc. (mg/kg)[1]	Detection Limit (mg/kg)
Sulfide Reactivity	ND	100	20
Cyanide Reactivity	ND	100	25

pH 8.23

CORROSIVITY Non-corrosive

IGNITABILITY >160°F

[1]Sulfide and Cyanide maximum concentrations are based upon NJ DEP guidelines. Federal regulatory levels are 500 mg/kg and 250 mg/kg respectively.

ENVIROTECH RESEARCH, INC.

Geraghty & Miller
7 Atlantic Street
Hackensack, NJ 07601
Attention: Ms. Doreen Sousa

Report Date: 7/25/88
Job No.: 4282
N.J. Certified Lab No. 12543
QA Batch 1115

PCB and Petroleum Hydrocarbons Analysis

Parameter	Lab No. 18407 Client ID: SP-1 94.2% Solid Units: mg/kg (Dry Weight)	Detection Limit Units: mg/kg
PCB-1016	ND	1.0
PCB-1221	ND	1.0
PCB-1232	ND	1.0
PCB-1242	ND	1.0
PCB-1248	ND	1.0
PCB-1254	ND	1.0
PCB-1260	ND	1.0
Petroleum Hydrocarbons[1]	3720	30

[1]Petroleum Hydrocarbons analyzed with QA Batch 1191.

ENVIROTECH RESEARCH, INC.

Geraghty & Miller
7 Atlantic Street
Hackensack, NJ 07601
Attention: Ms. Doreen Sousa

Report Date: 7/25/88
Job No.: 4282
N.J. Certified Lab No. 12543

HAZARDOUS WASTE CHARACTERISTICS ANALYSIS

EP-Toxicity Parameter	Lab No. 18408 Client ID: SP-2 Result (mg/l)	Maximum Conc. (mg/l)	Detection Limit (mg/l)
Arsenic	ND	5.0	0.01
Barium	ND	100	2.0
Cadmium	ND	1.0	0.02
Chromium	ND	5.0	0.2
Lead	ND	5.0	0.2
Mercury	ND	0.2	0.0002
Selenium	ND	1.0	0.01
Silver	ND	5.0	0.02

Parameter	Result (mg/kg)	Maximum Conc. (mg/kg)[1]	Detection Limit (mg/kg)
Sulfide Reactivity	ND	100	20
Cyanide Reactivity	ND	100	25

pH 8.78

CORROSIVITY Non-corrosive

IGNITABILITY >160°F

[1]Sulfide and Cyanide maximum concentrations are based upon NJ.DEP guidelines. Federal regulatory levels are 500 mg/kg and 250 mg/kg respectively.

ENVIROTECH RESEARCH, INC.

Geraghty & Miller
7 Atlantic Street
Hackensack, NJ 07601
Attention: Ms. Doreen Sousa

Report Date: 7/25/88
Job No.: 4282
N.J. Certified Lab No. 12543
QA Batch 1115

PCB and Petroleum Hydrocarbons Analysis

Parameter	Lab No. 18408 Client ID: SP-2 92.5% Solid Units: mg/kg (Dry Weight)	Detection Limit Units: mg/kg
PCB-1016	ND	2.0
PCB-1221	ND	2.0
PCB-1232	ND	2.0
PCB-1242	ND	2.0
PCB-1248	ND	2.0
PCB-1254	ND	2.0
PCB-1260	3.97	2.0
Petroleum Hydrocarbons[1]	12700	30

[1]Petroleum Hydrocarbons analyzed with QA Batch 1191.

[redacted] [redacted] C[redacted]IN-[redacted]CU[redacted]ODY [redacted]ECC[redacted]D [redacted] Page [redacted] /

Project Number NJ1533CR1

Project Location Carlstadt, NJ

Laboratory Envirotech

Sampler(s) D. Sousa

#4282 RUSH

SAMPLE IDENTITY	Date Sampled	TPHC + Hazardous I.D.										TOTAL
8407 SP-1	7-15-88	1										1
8408 SP-2	7-15-88	1										1

SAMPLE BOTTLE / CONTAINER DESCRIPTION

Total No. of Bottles/ Containers: 2

Relinquished by: Doreen Sousa	Organization: G+M	Date 7/15/88	Time 6:00 pm	Seal Intact? Yes No N/A
Received by: B. [illegible]	Organization: Envirotech	Date 7/15/88	Time 6:00 pm	
Relinquished by:	Organization:	Date / /	Time	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	

Special Instructions/Remarks: 7 DAY TURN-AROUND

Delivery Method: ☒ In Person ☐ Common Carrier ______ SPECIFY ☐ Lab Courier ☐ Other ______ SPECIFY

GAM Form 09 1 87

Geraghty & Miller
NAME OF CLIENT

ADDRESS

CITY STATE ZIP

Doreen Sousa
ATTENTION

PHONE

CHAIN-OF-CUSTODY RECORD

ENVIROTECH RESEARCH, INC.
777 NEW DURHAM ROAD
EDISON, N.J. 08817

(201) 549-3900

DATE SMPLD.	TIME SMPLD.	SMPLD. BY	MATRIX	PRES.	NO. OF CONT.	ENVIROTECH SAMPLE NUMBER	SAMPLE LOCATION/DESCRIPTION	ANALYSIS REQUESTED
					9	802	glass (PHC, BNAS, TOX-1)	

TOTAL NO. OF CONTAINERS: 9

SPECIAL INSTRUCTIONS

1. RELINQUISHED BY:	DATE/TIME	1. RECEIVED BY:	3. RELINQUISHED BY:	DATE/TIME	3. RECEIVED BY:
DS Hesser 7/14/88		Doreen Sousa			
2. RELINQUISHED BY:	DATE/TIME	2. RECEIVED BY:	4. RELINQUISHED BY:	DATE/TIME	4. RECEIVED BY:

LABORATORY CHRONICLE

ENVIROTECH RESEARCH, INC.
777 NEW DURHAM ROAD, EDISON, NJ 08817
(201) 549-3900

CLIENT Geraghty's Miller — DATE SAMPLED 7/15/88

MATRIX Soil — DATE RECEIVED 7/15/88

SAMPLE No. 18407 — JOB No. 4282

Analytic Parameter	Extraction Date/Time	Extractor's Initials	Analysis Date/Time	Analyst's Initials	QA Batch No.
TPH	7/18/88	MJC	7/19/88	LD	1191
PCB	7/19/88	LSD	7/19	LD	1115
pH			7/18/88	[illegible]	
Ignit.			7/18/88	[illegible]	
CN-React.			7/20/88	[illegible]	1035
S=React.			7/18/88	[illegible]	1035
Arsenic	7/19/88	KW	7/21/88 22:13	KH	1143
Barium	↓	↓	7/22/88 16:25	↓	1037
Cadmium			7/22/88 14:51		1131
Chromium			7/22/88 16:45		1094
Lead			7/22/88 15:16		1080
Selenium			7/21/88 15:57		1131
Silver			7/22/88 15:42	↓	1139
Mercury			7/20/88	KW	1133
EP Prep.	↓	↓			

LABORATORY CHRONICLE

ENVIROTECH RESEARCH, INC.

777 NEW DURHAM ROAD, EDISON, NJ 08817
(201) 549-3900

CLIENT Geraghty & Miller — DATE SAMPLED 7/15/88

MATRIX Soil — DATE RECEIVED 7/15/88

SAMPLE No. 18408 — JOB No. 4282

Analytic Parameter	Extraction Date/Time	Extractor's Initials	Analysis Date/Time	Analyst's Initials	QA Batch No.
TPH	7/18/88	MJC	7/19/88	LD	1191
PCB	7/19/88	LSD	7/19/88	LD	1115
pH			7/18/88	C.C	
Ignit.			7/18/88	C.C	
CN=React.			7/20/88	C.C	1035
S=React.			7/18/88	C.C	1035
Arsenic	7/19/88	KL	7/21/88 22:13	KL	1143
Barium	↓	↓	7/22/88 16:25	↓	1037
Cadmium			7/22/88 14:51		1131
Chromium			7/22/88 16:45		1094
Lead			7/22/88 15:16		1080
Selenium			7/21/88 18:57		1131
Silver			7/22/88 15:42	↓	1139
Mercury			7/20/88	KL	1133
EP Prep.	↓	↓			

APPENDIX C

Monitoring Well Geologic Logs

APPENDIX C

Well No.	Description	Depth (ft)
MW-1	Concrete, gravel.	0 - 3
	Sand, medium to fine, little silt, little fine gravel. Reddish brown, loose, slightly moist.	3 - 8
	Silt, some medium to fine sand, little medium gravel. Reddish brown, loose, slightly moist.	8 - 14
	Sand, medium to fine, some medium to coarse gravel, little silt. Reddish brown, slightly firm, moist.	14 - 19
	Silt, trace clay, little coarse sand, weathered rock (shale). Reddish brown, firm, dry.	19 - 24
	Rock fragments (shale). Reddish brown, dry.	24 - 26
MW-2	Concrete and fill.	0 - 3
	Sand, fine to coarse, little silt, trace fine gravel. Reddish brown, loose, moist.	3 - 9
	Silt, some fine to coarse gravel. Reddish brown, medium firm, wet.	9 - 18
	Silt, little fine to medium sand, little fine to coarse gravel, rock fragments (shale). Reddish brown, firm, dry.	18 - 22
MW-3	Concrete and fill.	0 - 3
	Sand, medium to fine, little silt, trace fine to coarse gravel. Reddish brown, loose, dry.	3 - 8
	Silt, little coarse to fine gravel, trace fine sand. Reddish brown, medium firm, moist.	8 - 19
	Silt, trace sand, trace gravel, rock fragments (shale). Reddish brown, dry, firm.	19 - 22

#NJ1533CR01/102588.

APPENDIX E

New Jersey Department of Environmental Protection
Bureau of Industrial Site Evaluation
Recommended Cleanup Guidelines

CLEANUP LEVELS USED BY BISE

A. Soil	Concentration
Arsenic	20 ppm
Barium	400
Cadmium	3
Chromium	100
Copper	170
Lead	100
Nickel	100
Mercury	1
Petroleum Hydrocarbons	100
Polychlorinated Biphenyls	1-5
Silver	5
Selenium	4
Total Cyanides	12
Total Volatile Organics	1
Zinc	350

B. Ground Water	Concentration
Petroleum Hydrocarbons	1 ppm
Total Volatile Organics	10 ppb*
Total Base /Neutral Organics	50 ppb*
Total Acid Extractable Organics	50 ppb*
Others	See Ground Water Quality Standards, N.J.A.C. 7:9-6.6

HS109:kc

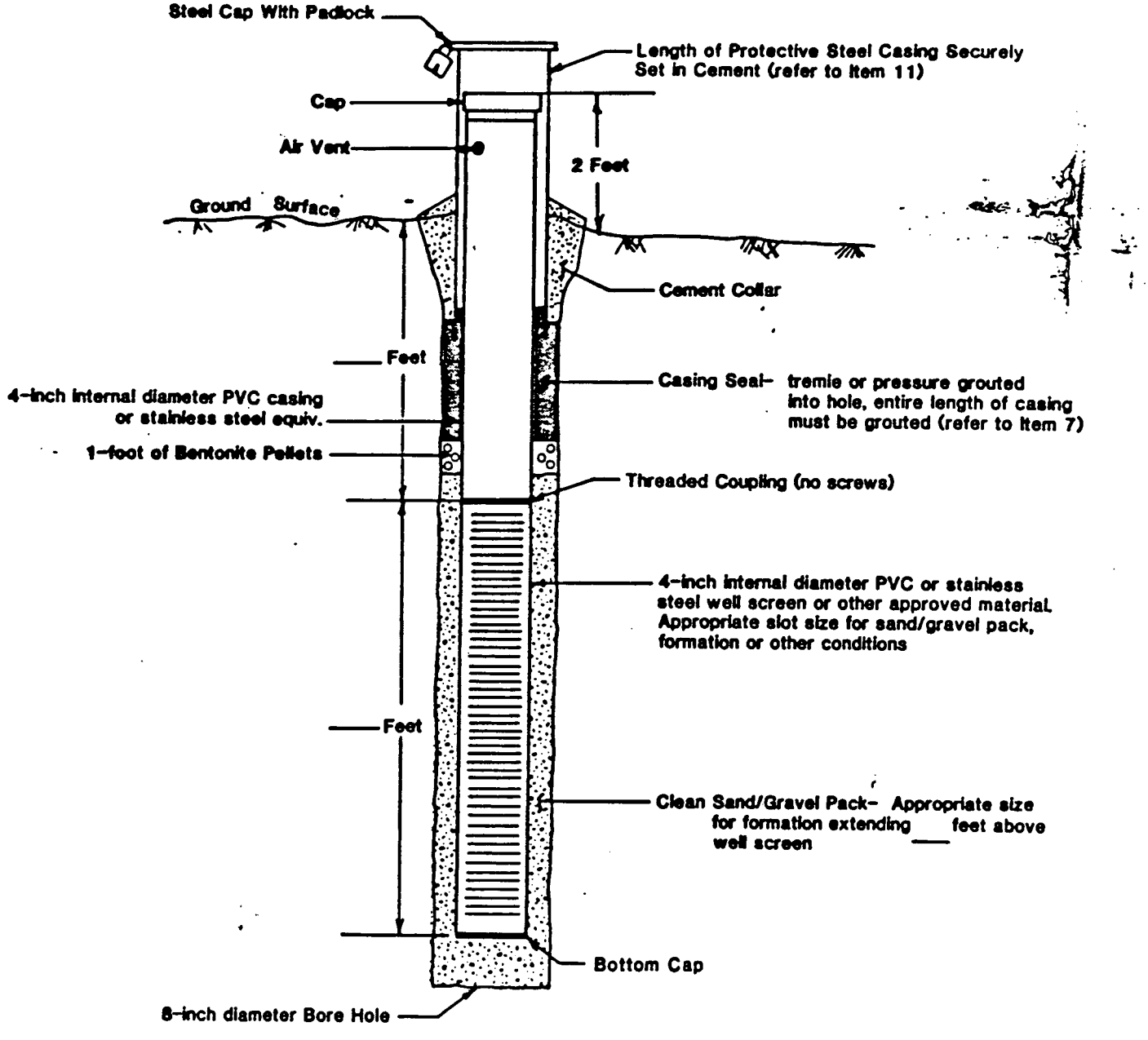
*Lesser concentrations for specific chemicals may be utilized based upon 10^{-6} cancer risk and/or other toxicologic factors

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
MONITOR WELL SPECIFICATIONS FOR
UNCONSOLIDATED FORMATIONS

SITE NAME : _____

LOCATION : _____

DATE : _____



NOT TO SCALE

NJGS Revised 9-87